

## Fixed effects vs. Random effects

webuse nlswork  
 (National Longitudinal Survey. Young Women 14–26 years of age in 1968)

### Fixed effects:

```
xtreg ln_w grade age c.age#c.age ttl_exp c.ttl_exp#c.ttl_exp tenure c.tenure#c.tenure
2.race not_smsa south, fe
note: grade omitted because of collinearity << time-invariant variable
note: 2.race omitted because of collinearity << time-invariant variable
```

```
Fixed-effects (within) regression      Number of obs      =    28091
Group variable: idcode                Number of groups   =     4697
```

```
R-sq:  within = 0.1727                Obs per group:  min =      1
      between = 0.3505                    avg =      6.0
      overall = 0.2625                    max =     15
```

```
corr(u_i, Xb) = 0.1936 <<corr b/w ai,Xb    F(8,23386)        =    610.12
                                          Prob > F          =     0.0000
```

ln_wage	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
grade	0 (omitted)					
age	.0359987	.0033864	10.63	0.000	.0293611	.0426362
c.age#c.age	-.000723	.0000533	-13.58	0.000	-.0008274	-.0006186
ttl_exp	.0334668	.0029653	11.29	0.000	.0276545	.039279
c.ttl_exp#c.ttl_exp	.0002163	.0001277	1.69	0.090	-.0000341	.0004666
tenure	.0357539	.0018487	19.34	0.000	.0321303	.0393775
c.tenure#c.tenure	-.0019701	.000125	-15.76	0.000	-.0022151	-.0017251
2.race	0 (omitted)					
not_smsa	-.0890108	.0095316	-9.34	0.000	-.1076933	-.0703282
south	-.0606309	.0109319	-5.55	0.000	-.0820582	-.0392036
_cons	1.03732	.0485546	21.36	0.000	.9421496	1.13249
sigma_u	.35562203					
sigma_e	.29068923					
rho	.59946283	(fraction of variance due to u_i)				

```
F test that all u_i=0:      F(4696, 23386) =    6.65      Prob > F = 0.0000
```

estimates store fe

### Random effects:

```
xtreg ln_w grade age c.age#c.age ttl_exp c.ttl_exp#c.ttl_exp tenure c.tenure#c.tenure
2.race not_smsa south, re
```

```
Random-effects GLS regression      Number of obs      =    28091
Group variable: idcode                Number of groups   =     4697
```

```
R-sq:  within = 0.1715                Obs per group:  min =      1
      between = 0.4784                    avg =      6.0
      overall = 0.3708                    max =     15
```

```
corr(u_i, X) = 0 (assumed)          Wald chi2(10)     =    9244.74
                                          Prob > chi2       =     0.0000
```

ln_wage	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
grade	.0646499	.0017812	36.30	0.000	.0611589	.0681409
age	.0368059	.0031195	11.80	0.000	.0306918	.0429201

c.age#c.age	-.0007133	.00005	-14.27	0.000	-.0008113	-.0006153
t1l_exp	.0290208	.002422	11.98	0.000	.0242739	.0337678
c.t1l_exp#c.t1l_exp	.0003049	.0001162	2.62	0.009	.000077	.0005327
tenure	.0392519	.0017554	22.36	0.000	.0358113	.0426925
c.tenure#c.tenure	-.0020035	.0001193	-16.80	0.000	-.0022373	-.0017697
2.race	-.053053	.0099926	-5.31	0.000	-.0726381	-.0334679
not_smsa	-.1308252	.0071751	-18.23	0.000	-.1448881	-.1167622
south	-.0868922	.0073032	-11.90	0.000	-.1012062	-.0725781
_cons	.2387207	.049469	4.83	0.000	.1417633	.3356781
-----						
sigma_u	.25790526					
sigma_e	.29068923					
rho	.44045273	(fraction of variance due to u_i)				

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	---- Coefficients ----			
	(b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
age	.0359987	.0368059	-.0008073	.0013177
c.age#c.age	-.000723	-.0007133	-9.68e-06	.0000184
t1l_exp	.0334668	.0290208	.0044459	.001711
c.t1l_exp#~p	.0002163	.0003049	-.0000886	.000053
tenure	.0357539	.0392519	-.003498	.0005797
c.tenure#c~e	-.0019701	-.0020035	.0000334	.0000373
not_smsa	-.0890108	-.1308252	.0418144	.0062745
south	-.0606309	-.0868922	.0262613	.0081345

b = consistent under Ho and Ha; obtained from xtreg  
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(8) = (b-B)'[(V\_b-V\_B)^(-1)](b-B)  
 = 149.43  
 Prob>chi2 = 0.0000 >> reject Ho, Fixed effect is preferred

xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

$$\ln\_wage[idcode,t] = Xb + u[idcode] + e[idcode,t]$$

Estimated results:

	Var	sd = sqrt(Var)
ln_wage	.2283326	.4778416
e	.0845002	.2906892
u	.0665151	.2579053

Test: Var(u) = 0  
 chibar2(01) = 14779.98  
 Prob > chibar2 = 0.0000 >> reject Ho, RE is preferred to Pooled OLS